

CLAIMS

What is claimed is:

1. A method of preparing an integrated circuit (IC) for thermal testing, the

5 method comprising:

designing a layout of the IC to include a temperature generation device to be positioned within the IC, wherein the temperature generation device functions for a primary purpose of affecting a temperature at the IC; and

constructing the IC with the temperature generation device positioned within the IC.

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2. The method according to claim 1, further comprising providing a user with instructions to operate the temperature generation device to perform thermal testing on the IC.

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3. The method according to claim 1, further comprising the step of positioning a temperature sensor within close proximity to the IC.

4. The method according to claim 3, comprising the more specific step of positioning the temperature sensor within the IC.

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5. The method according to claim 4, further comprising the step of locating multiple temperature sensors and multiple temperature generation devices at various positions within the IC.

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6. The method according to claim 3, further comprising the step of providing a temperature controller coupled to the temperature generation device and the temperature sensor.

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7. The method according to claim 6, comprising the more specific step of positioning the temperature controller within the IC.

8. The method according to claim 1, further comprising the step of locating the IC within an IC wafer.

9. The method according to claim 1, further comprising the step of separating the IC from an IC wafer, creating an independent IC device.

10. The method according to claim 1, further comprising the step of positioning
5 the IC on a circuit board that is populated with peripheral devices which would be present during actual operation of the IC.

11. A method for thermally testing an integrated circuit (IC), the method comprising:

10 operating a temperature generation device located within the IC for the primary purpose of affecting a temperature at the IC; and
sensing the temperature at the IC.

12. The method according to claim 11, including the more specific step of sensing
15 the temperature at the IC using a temperature sensor located within close proximity to the IC.

13. The method according to claim 12, including the more specific step of sensing the temperature at the IC using a temperature sensor located within the IC.

20 14. The method according to claim 12, further comprising the steps of:
initializing a test of the IC, including presetting a target temperature to be maintained at the
IC;
enabling the temperature sensor;
enabling and regulating the temperature generation device until the temperature at the IC
25 reaches the target temperature;
initializing a functional test for the IC; and
offsetting changes in the temperature at the IC with a change in regulation of the temperature generation device to achieve the target temperature during the functional test to the
IC.

30 15. The method according to claim 12, further comprising the step of applying the temperature sensor to communicate in real-time with an integrally formed power management unit used with the IC for a primary purpose of adjusting voltage levels and frequency of the IC.

16. The method according to claim 11, further comprising the step of communicating the temperature at the IC to a temperature controller.

5 17. The method according to claim 11, further comprising the step of predefining a maximum allowable temperature for the IC.

18. A method for thermally assisted testing of an integrated circuit (IC), the method comprising:

- 10 (a) setting a target temperature to be generated by a temperature generation device located within the IC;
- (b) operating the temperature generation device to generate the target temperature;
- (c) operating the IC;
- (d) sensing a temperature associated with the IC; and
- 15 (d) adjusting the target temperature of the temperature generation device relative to the temperature associated with the IC.

19. The method according to claim 18, further comprising the step of communicating the temperature associated with the IC to a temperature controller.

20 20. The method according to claim 19, comprising the more specific step of using the temperature controller to adjust the target temperature depending on the temperature associated with the IC, and to instruct the temperature generation device to generate the target temperature.

25 21. The method according to claim 18, further comprising the step of initializing a functional test of the IC.

22. The method according to claim 18, further comprising the step of configuring the temperature controller to maintain the temperature associated with the IC at a substantially constant temperature by offsetting changes in the temperature associated with the IC and any peripheral devices with a change in the target temperature to be generated by the temperature generation device.

23. The method according to claim 18, comprising the more specific step of sensing a temperature associated with the IC, using a temperature sensor located within the IC.

5 24. A system for thermally assisted testing of an integrated circuit (IC), comprising:
a temperature generation device located within the IC and configured for a primary purpose
of affecting a temperature at the IC;
a temperature sensor located within close proximity to the IC; and
10 a temperature controller coupled to the temperature generation device and to the temperature
sensor.

15 25. The system according to claim 24, wherein the device is also comprised of a power management unit electronically coupled to the temperature sensor and configured for
adjusting voltage levels and frequency of the IC, wherein the power management unit
communicates in real-time with the temperature sensor.

20 26. The system according to claim 24, wherein the temperature sensor is installed
within the IC.

27. The system according to claim 26, wherein multiple temperature sensors and
multiple temperature generation devices are located at various positions throughout the IC.

25 28. The system according to claim 24, wherein the temperature controller is
installed within the IC.

30 29. A method for thermally assisted testing of an integrated circuit (IC), the
method comprising:
initializing a test of the IC, including presetting a target temperature to be maintained at the
IC;
enabling a temperature sensor located within close proximity to the IC;
enabling and regulating a temperature generation device located within the IC until a
temperature associated with the IC reaches the target temperature;
initializing a functional test for the IC; and

offsetting changes in the temperature associated with the IC with a change in regulation of the temperature generation device to achieve the target temperature during the functional test to the IC.

5 30. The method according to claim 29, comprising the more specific step of installing the temperature sensor within the IC.